Florida Power
CORPORATION

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Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Addition of Third Emergency Feedwater Pump

Dear Mr. Denton:

Pursuant to our letters dated November 6, 1980 (IREP Study Recommendations), March 6, 1981 (Nuclear Safety Task Force Followup), and August 11, 1981 (Emergency Feedwater System Upgrade), Florida Power Corporation has evaluated the addition of a third emergency feedwater (EFW) pump. By this letter, we hereby share with you the results of our evaluations.

Three options were evaluated for the third EFW pump. These were: a turbine-driven pump, a motor-driven pump with a dedicated diesel generator, and a diesel-driven pump. In addition, two steam supply options and three pump suction options were evaluated. The enhancement in reliability for each option was compared with the reliability of the proposed two-pump system (including an upgraded initiation and control system as described in our August 11, 1981, letter to Mr. John F. Stolz).

The costs of the various options having the greatest reliability were estimated and the core melt frequency (assuming loss of off-site power (LOOP)) was calculated for each of the three EFW system configurations. Data from WASH-1400 was used to correlate degraded core to risk parameters in terms of early deaths, latent deaths, property damage, and radiation dosage. The derived risk parameters associated with core melt are:

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Early Fatalities per core melt	= 0.6
Equivalent Early Fatalities per core melt*	= 2.0
Latent Fatalities per core melt	= 420
Property Damage per core melt	= $780 x 10^6
Radiation Dosage per core melt	= 4.2 x 10^6 man-rem

*ACRS uses equivalent early fatalities in determining safety goals. The equivalent early death figure accounts for the perceived severity differential between high fatality - low probability accidents and low fatality - high probability accidents.

The product of the LOOP frequency, the probability of core melt after LOOP, and the derived risk parameters is the societal risk parameter.

$$\left(\begin{array}{c}\text{societal}\\ \text{risk}\\ \text{parameter}\end{array}\right) = \left(f_{LOOP}\right) \times \left(P_{cm/LOOP}\right) \times \left(\begin{array}{c}\text{derived}\\ \text{risk}\\ \text{parameter}\end{array}\right)$$

The societal risk parameter results are shown in Table 1, along with the ACRS and AIF safety goals. In all cases, the results are at least three orders of magnitude below the safety goals.

The first part of the analysis provided an evaluation of the cost/benefit ratio of the third pump configurations as compared to the two-pump configuration. This is achieved by dividing the differential cost of the modification compared to the base case by the change in societal risk, over a 30 year plant lifetime. For each type of risk evaluated, the incremental cost of the third train designs is not justifiable under the safety benefit guidelines suggested for use in the regulatory process (ACRS) or the nuclear industry proposed guidelines (AIF).

Based upon the results of our evaluation, Florida Power Corporation has concluded that addition of a third EFW pump is not necessary for the following reasons:

- The unavailability of the CR-3 upgraded two-pump EFW system (2 x 10^{-4}) is similar to the typical EFW system value (1.5 x 10^{-4}) presented in WASH-1400 Appendix 5, Table V-4-1.

- The CR-3 existing two-pump system (with upgrade installed) exceeds all of the proposed safety criteria.

- None of the three pump designs satisfy the proposed NRC or AIF cost/benefit criteria.

Very truly yours,

Patsy J. Baynard

Dr. P. Y. Baynard
Manager
Nuclear Support Services

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Attachment

TABLE I
COST/BENEFIT RESULTS SUMMARY

	Upgraded 2-Pump Sys.	Steam Driven 3rd Pump	Diesel Driven 3rd Pump	Diesel Gen. 3rd Pump	Proposed AIF Goal	Proposed NRC Goal	COMMENTS
EFW Failures/Yr.	2×10^{-4}	2×10^{-5}	5×10^{-6}	5×10^{-6}	-	-	None
Dollars to Install	-	5.9×10^{6}	7.5×10^{6}	8.9×10^{6}	-	-	None
Core Melts / Rx - Yr	1.1×10^{-5}	3.4×10^{-6}	3.4×10^{-6}	3.4×10^{-6}	1×10^{-4}	1×10^{-4}	
Early Deaths / Rx - Yr	2.2×10^{-5}	6.8×10^{-6}	6.8×10^{-6}	6.8×10^{-6}	-	3×10^{-1}	
Latent Deaths / Rx - Yr	4.5×10^{-3}	1.4×10^{-3}	1.4×10^{-3}	1.4×10^{-3}	-	1.4	Upgraded System Exceeds All Proposed Safety Goals
Total Deaths / Rx - Yr	4.5×10^{-3}	1.4×10^{-3}	1.4×10^{-3}	1.4×10^{-3}	8×10^{-1}	-	
Dollars* / Man-Rem Averted	-	6,340	8,060	9,564	100	1,000 $	
Dollars* / Early Death Averted	-	1.3×10^{10}	1.6×10^{10}	2.0×10^{10}	-	5×10^{6} #	Modifications Do Not Meet Proposed Cost/Benefit Criteria
Dollars* / Latent Death Averted		6.3×10^{7}	8.1×10^{7}	9.6×10^{7}	-	1×10^{6} #	
Dollars / Property Damage Averted		34	43	51	-	2	

* - Assumes 30 Year Plant Life
$ - Regulatory Guide 1.110 "Cost-Benefit Analysis for Radwaste Systems for Light-Water-Cooled Nuclear Power Plants"
# - NUREG-0739 "An Approach to Quantitative Safety Goals for Nuclear Power Plants"